

Listing of Claims

This list of claims will replace all prior versions, and listings of claims in the application:

1. (Currently amended). A method to stabilize high aspect ratio, post-etch lithographic feature against collapse, the method comprising the steps of:
 - (a) coating a substrate with a substantially organic underlayer;
 - (b) coating said underlayer with a photoresist comprising materials that form a stable, etch-resistant, non-volatile oxide;
 - (c) imagewise exposing said photoresist to radiation;
 - (d) developing an image in said photoresist;
 - (e) transferring said image through said underlayer into said substrate thus forming a high aspect ratio resist image; and
 - (f) treating said high aspect ratio resist image with a chemically-reducing plasma.
2. (Original). A method to stabilize high aspect ratio, post-etch lithographic feature against collapse, according to claim 1, wherein said photoresist comprises an element capable of forming a stable, etch-resistant, non-volatile oxide selected from the group consisting of silicon, phosphorous, germanium, aluminum, and boron.
3. (Previously presented). A method to stabilize high aspect ratio, post-etch lithographic images against collapse, according to claim 1, wherein said resist is a bilayer resist comprising:
 - an organic underlayer formed on said substrate; and
 - a photoresist comprising materials that form a stable, etch-resistant, non-volatile oxide formed on said underlayer.
4. (Original). A method to stabilize high aspect ratio, post-etch lithographic images against collapse, according to claim 1, wherein transferring said image comprises etching wherein said etching comprises passivating chemistry.
5. (Previously presented). A method to stabilize high aspect ratio, post-etch

lithographic images against collapse, according to claim 4, wherein passivating chemistry comprises any process that generates hygroscopic moieties.

6. (Previously presented). A method to stabilize high aspect ratio, post-etch lithographic images against collapse, according to claim 4, wherein passivating chemistry comprises an SO₂ and O₂ containing plasma.

7. (Original). A method to stabilize high aspect ratio, post-etch lithographic images against collapse, according to claim 1, wherein said chemically-reducing plasma comprises hydrogen.

8. (Original). A method to stabilize high aspect ratio, post-etch lithographic images against collapse, according to claim 1, wherein said chemically-reducing plasma comprises a hydrogen-generating species.

9. (Original). A method to stabilize high aspect ratio, post-etch lithographic images against collapse, according to claim 1, wherein said underlayer comprises an organic material selected from the group consisting of tuned polymers, novolacs, and low-k dielectrics.

10. (Original). A method to stabilize high aspect ratio, post-etch lithographic images against collapse, according to claim 1, wherein said underlayer comprises an organic material essentially comprising carbon, hydrogen, and oxygen.

11. (Original). A method to stabilize high aspect ratio, post-etch lithographic images against collapse, according to claim 1, wherein said photoresist comprises a polymer having acid-cleavable moieties bound thereto.

12. (Original). A method to stabilize high aspect ratio, post-etch lithographic images against collapse, according to claim 1, wherein said photoresist comprises a polymer formed by polymerizing one or more monomers selected from the group consisting of acrylate, methacrylate, hydroxystyrene optionally substituted with Cl-6-alkyl, CS-2o cyclic olefin

monomers, and combinations thereof, the polymer having acid-cleavable moieties bound thereto, wherein all such moieties are silyloxy groups optionally substituted on the ethoxy portion thereof with CI-6-alkyl, phenyl, or benzyl.

13. (Original). A method to stabilize high aspect ratio, post-etch lithographic images against collapse, according to claim 1, wherein said photoresist comprises a radiation-sensitive acid generator.

14. (Original). A method to stabilize high aspect ratio, post-etch lithographic images against collapse, according to claim 1, wherein said radiation comprises electromagnetic radiation or electron beam radiation.

15. (Original). A method to stabilize high aspect ratio, post-etch lithographic images against collapse, according to claim 1, wherein said radiation comprises ultraviolet radiation or extreme ultraviolet radiation.

16. (Original). A method to stabilize high aspect ratio, post-etch lithographic images against collapse, according to claim 1, wherein said radiation comprises x-ray radiation.

17. (Original). A method to stabilize high aspect ratio, post-etch lithographic images against collapse, according to claim 1, wherein transferring said image further comprises forming a reduced critical dimension bilayer resist image.

18. (Withdrawn). The stabilized high aspect ratio, post-etch lithographic image formed according to claim 1.

19. (Withdrawn). The semiconductor device fabricated using the stabilized high aspect ratio image formed according to claim 1.

20. (Currently amended). A method of fabricating semiconductor devices using a stabilized, high aspect ratio bilayer resist image comprising the steps of:

- (a) coating a substrate with an organic underlayer;
- (b) coating said underlayer with a photoresist comprising a material that form a stable, etch-resistant, non-volatile oxide;
- (c) imagewise exposing said photoresist to radiation;
- (d) developing an image in said photoresist;
- (e) transferring said image through said underlayer into said substrate thus forming a high aspect ratio resist image;
- (f) treating said high aspect ratio resist image with a chemically-reducing plasma;
- (g) transferring said image into said substrate forming a circuit image; and
- (h) forming circuit element materials in said circuit image.

21. (Original). A method of fabricating semiconductor devices using a stabilized, high aspect ration bilayer resist image, according to claim 20, wherein said circuit element materials comprise materials selected from the group consisting of dielectric, conductor, semiconductor, and doped semiconductor materials.

22. (Withdrawn). The stabilized high aspect ratio, post-etch lithographic image formed according to claim 1, wherein said resist is a trilayer resist.

23. (Withdrawn). The stabilized high aspect ratio, post-etch lithographic image formed according to claim 22, wherein said trilayer resist comprises:
an organic resist;
an anti-reflective coating; an inorganic hard mask; and
a thick organic layer.

24. (Withdrawn). The stabilized high aspect ratio, post-etch lithographic image formed according to claim 23, wherein said hard mask comprises silicon.

25. (Withdrawn). The semiconductor device fabricated using a reduced critical dimension bilayer resist image, according to claim 20.

26. (Withdrawn). The semiconductor device fabricated using a stabilized high aspect ratio, postetch lithographic image formed according to claim 23.